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B P I S A E

RESEARCH ACTIVITIES

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PLANT INDUSTRY STATION, BELTSVILLE, MD.

AUGUST 1949

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Seed Trade Cooperates in Introduction of New Vegetable Varieties

The present plan developed jointly by government and industry for releasing vegetable varieties is proving generally satisfactory both to the plant breeders and the seed trade in the opinion of Dr. V. R. Boswell (F&VC&D). Reviewing the plan in a recent talk before the American Seed Trade Association, Dr. Boswell pointed out that it had evolved out of the trials and errors of several years' experience.

Because the creation of varieties having certain desired characteristics and meeting specific needs may require the work of several men over a period of 10 to 20 years, such jobs must be done at public expense for public benefit.

For several years the Bureau grew all the initial foundation stock of a new vegetable variety, then distributed a small quantity of the foundation seed to every seed producer on the list and announced the release when this seed was distributed. Two difficulties resulted: (1) The small amount of seed was sometimes literally lost in the large operations of some companies; (2) the companies were deluged with orders for the seed before they had an ample supply in stock.

The plan of introduction now in use was initiated in 1944 when the Vegetable Research Committee of the Association agreed to serve as an impartial agency and to suggest two or three firms to make initial increase of any one item for subsequent release. This increase is then returned in its entirety to the Bureau for redistribution to all interested seed producers. After they have had the item for a year or two--long enough to build up adequate stocks--public announcement of the variety is made.

Paying tribute to the seedsmen's cooperation, Dr. Boswell said, "We realize that handling small increases often is a rather irksome chore for the field men and that growing the stock for us costs the seedsmen more than the price received. It is done as a genuine service. The whole scheme is built entirely upon the good faith and integrity of individuals in public agencies and private companies." The Bureau appreciates this cooperation.

New Potato Storage Project in East

The Division of Farm Buildings and Rural Housing is cooperating with the New Jersey, New York, and Pennsylvania Experiment Stations in a new line project under RMA to determine the most efficient and practical types of building, equipment, and operating procedures for the storage of potatoes on the farm and at local shipping points for climatic and marketing conditions of the area.

Three types of storage will be studied: Common underground with thermostatically controlled ventilation; common above ground, insulated, and with controlled ventilation; and refrigerated storages. The investigations will provide data on temperatures of potatoes when dug, stored, and periodically during storage; handling practices in the field and in storage; prestorage condition of potatoes with respect to injury and disease; and construction and operating costs of the storages.

Richard S. Claycomb will be in charge of the Bureau's part in the project, with headquarters at New Brunswick, N. J. A graduate of Colorado A. & M. College, Mr. Claycomb has been working with S. W. McBirney (FM) on sugar beet harvesting studies at Fort Collins, Colo.

Alfred D. Edgar (FB&RH), potato storage project leader, came east in July to set up the new project and to confer with potato workers at Beltsville on new research to be undertaken at the Red River Valley Potato Research Center, East Grand Forks, Minn., where he will be located.

Research on Toxicity of New Chemicals to be Expanded

Findings by A. C. Foster, M. C. Goldsworthy, and others in the Bureau on the toxicity of some of the new pesticides to plants have increased the demand for more work along these lines.

Two new groups have been formed to explore research possibilities and plan a coordinated attack. One of these is a Department research panel of technical workers from various bureaus set up in the Agricultural Research Administration--and probably the Public Health Service and the Food and Drug Administration--set up to review current work on the problem and to suggest lines of research and mutually helpful plans for getting the information as economically as possible.

The other is a regional technical committee established by directors of the agricultural experiment stations in the North Central States to counsel with Federal and commercial agencies on the problem.

Dr. Victor R. Boswell (F&VC&D) represents the Bureau in these groups. He is also assisting in planning the expanded technical work to be undertaken in the Bureau. Information or suggestions for consideration in planning the work in the Bureau, in the panel, or the regional committee may be sent directly to Dr. Boswell at Plant Industry Station.

Coconut Palm Disease on Caribbean Islands

At the request of the Caribbean Commission, G. F. Gravatt (FP) recently spent 2 weeks in Jamaica and Bahamas studying a coconut palm disease that has caused heavy losses. Of unknown origin the trouble has been present for several years and has killed most of the coconut palms in northwest Jamaica and is spreading slowly into other areas. Infection is less severe in the Bahamas. The disease has not been observed in the extensive plantings of ornamental coconut palms in Florida.

AUGUST 1949

Research Progress on Newly Irrigated Soils

Nitrogen is the main limiting factor in crop yields on newly irrigated soils in the Columbia River Basin. The amount of water required depends on the soil type and the climate. The optimum time of irrigation depends on the crop. If supplied at the proper time, water through part of the season is just as effective as through the whole season.

These findings are noted by Dr. Ross W. Leamer (SM&I) in a progress report on experiments at Hermiston, Ore., and at Prosser and Moses Lake, Wash.

Applications of nitrogen up to 240 pounds per acre increased corn yields at all three locations. Potato yields were increased by nitrogen applications up to 120 pounds per acre at two locations and up to 160 pounds at the third.

Hairy vetch is the crop most frequently recommended for this area for winter and early spring cover. Tests at Moses Lake indicate that the nitrogen in the tops of vetch at time of plowing is about as effective in increasing corn and potato yields as one-half the same amount of inorganic nitrogen applied at time of planting. The vetch appears to have very little effect the second year.

Applications of P_2O_5 increase potato yields but not corn.

Yields of neither potatoes nor corn were increased by increasing plant populations beyond the common local practice, which provides fairly dense populations in comparison with other regions.

Most crops have critical stages of growth in regard to water supply. Corn amply supplied at the time of tasseling and silking will withstand moderate periods of drought at other times without reduction in yield. Potatoes kept moist from the time of tuber initiation will yield as much as those kept wet all through the season. The sugar content of beets can be increased by allowing them to become dry a few weeks before harvesting. Irrigation following a dry period reduces the sugar content rather markedly.

Identify Soil Type of Experimental Plot

Get expert assistance in identifying the soils of your experimental plots, advises Dr. Carleton P. Barnes (SS). The soil type on which the experiment is conducted may affect your research results significantly. If you know the name of the soil you can predict much better the places--with similar soils--where knowledge gained from the experiments can be safely applied.

Dr. Barnes points out that you can obtain help in identifying the soils of experimental plots and fields from the Division of Soil Survey at Plant Industry Station or from the soils departments at the State agricultural experiment stations.

Do not depend on soil maps for identifying the type of soil in small experimental plots. Very small areas of soil types cannot always be shown at the scale of map publication. To report an experiment as being on the soil shown in the map for the general area might be misleading. The maps are extremely useful, of course, in showing where soils similar to those of the experiment are located.

Ten Promising Plant Introductions

Speaking recently before the American Seed Trade Association, C. O. Erlanson (PE&I) listed promising plant introductions of recent years as follows:

1. Pangola grass, a comparative newcomer from South Africa, has been found so well suited to certain parts of our South that its production has multiplied rapidly into thousands of acres.
2. Turkistan Bluestem shows good promise in the south-central part of the United States where the Asiatic lespedezas introduced in earlier years caused a minor revolution in agricultural practices.
3. Certain French and Italian strains of birdsfoot trefoil are now being examined with great interest in forage mixtures for humid areas of our northern states.
4. Because of its great tolerance to alkaline soil, tall wheatgrass from the Near East is finding a place in the high intermountain area where more abundant pasture is badly needed.
5. Although Europe has only four native kinds of lupines, two of them brought to our Southern States are now important cultivated cover crops. There are 10 times as many native species of lupines in this country that should be examined for their potentialities.
6. From a large assortment of about 700 introduced barleys brought in from widely scattered parts of the world, 15 have been found to be highly immune to loose smut and at the same time tolerant to winter conditions at Columbia, Mo.
7. A spinach from southern Asia that carries a dominant resistant character for breeding against the downy mildew disease now attacking commercial spinach crops.
8. The reintroduction of our native eastern grapes from France as natural hybrids with the Old World vinifera types, some of which appear to be valuable as new types for eastern United States.
9. An apple, Schöner aus Nordhausen, introduced from Germany in 1937, has a fruit characteristic that should be of interest to breeders. The oxidases, normally present in apples and which cause the flesh to turn brown after exposure to air, are apparently lacking. This means that the flesh remains white and fresh for long periods and can be used for salads and other preparations where appearance is important.
10. The Chinese wing nut, an Asiatic relative of the walnut, is now recommended as stock for commercial orchards in the West. It is more vigorous and more resistant to nematodes than the stock commonly used.

Grain Storage Plans Published

Working plans for 30 ear corn and small-grain structures, which range from a 300-bushel self-feeder for hogs to 10,000-bushel farm elevators, have been published by the Midwest Plan Service, Ames, Iowa. They were designed jointly by agricultural engineers of the Division of Farm Buildings and Rural Housing and the agricultural experiment stations of the North Central States in cooperation with BEPQ, PMA, and the Extension Service. The plans are available from the State extension services. Also available is a catalog illustrating them.

Land Resources Should be Appraised Regionally and Nationally

The need to appraise our land resources both regionally and nationally was emphasized by Dr. Charles E. Kellogg and Dr. Carleton P. Barnes (SS) in talks before a recent seminar of the Land Economics Institute at Iowa State College.

They pointed out that much of the largest part of the nation's uncultivated but potentially productive farm land lies in the southeastern quarter of the country. Here there are also many farm people in need of better opportunity for livelihood. Dr. Kellogg and Dr. Barnes believe this suggests the importance of considering the availability of land resources and the needs of all regions in choosing areas in which to make public investments for new land development. They also stressed the importance of fostering industrial as well as new agricultural development to afford better opportunities for livelihood.

Under modern systems of soil, crop, and livestock management, the United States has ample land resources to provide adequate food for its population in the foreseeable future. Dr. Kellogg and Dr. Barnes see no immediate need to develop any substantial acreage of new lands in crops and pastures to meet national food requirements but believe there may be need to develop new land in some sections to afford better economic opportunities for farm families who had inadequate land resources.

Maturity Key Factor in Treating Iris Bulbs

Wilbur D. Courtney (Nematology) and C. J. Gould of the Western Washington Experiment Station at Puyallup have recently completed tests to show that properly matured iris bulbs can be successfully treated in hot-water-formalin adequate for control of bulb or stem nematodes. Ability of the bulbs to withstand the treatment depends upon maturity at the time of treatment. They mature at different dates in different locations and regions. In Puyallup Valley bulbous iris must be dug early in July and treated 4 to 6 weeks afterward, but before late August.

Bulbous iris produce an annual income of 1 million dollars to Oregon and Washington growers. Losses due to nematode injury prior to the present bulb treatment ranged from a trace to 60 percent. The average of 20 percent amounted to \$200,000 annually.

Sheller or Thresher Devised for Small Lots

J. H. Beattie (F&VC&D) has developed a simple, small, inexpensive, and highly effective device for shelling small samples of peanuts, peas, and beans. Designed to handle samples or lots too small to run through a conventional sheller or thresher, it eliminates hand shelling or threshing of single-plant selections. Those who have used it the past year or two found that it reduced the costs of handling small lots. It should be of general interest to breeders and others who deal with small lots of the crops to which it is adapted. Mr. Beattie has prepared a description of the device and its operation for publication in the Journal of Agronomy.

Recent Findings in Weed Control Research

A round-up of recent findings in weed control research reported by L. W. Kephart, F. L. Timmons, and L. M. Stahler (CC&D) indicate that:

(1) Preemergence treatments generally have not controlled weeds satisfactorily where dry soil prevailed.

(2) Use of herbicides to control mesquite is promising. In a new technique the chemicals are applied to the small branches so the translocation and toxicity can be measured quickly and the effect of a number of applications can be determined on a single bush or tree.

(3) Time of application is a most important factor in the control of sand sage on range lands. The first 3 weeks in May appear to be the most effective time for applying sprays in western Oklahoma.

(4) Sodium trichloroacetate controls prickly pear cactus and yuccas and is the most promising chemical tried for control of weedy grasses, at present the chief deterrent to complete mechanization for the production of several crops.

The wheatfields of the central hard red winter wheat region were again exceptionally weedy in 1949 because emergence of the grain was delayed during a dry fall. As in 1948, spray applications of 2,4-D were made with considerable success either in the boot or in the dough stage. Some injury to the crop followed spraying between the boot and soft dough stages.

About the Origin and Travels of Vegetables

The leading article in the National Geographic Magazine for August 1949 is "Our Vegetable Travelers," by Victor R. Boswell. Dr. Boswell brings out, in vivid style, the main points about the known history of our commonly grown vegetables, their places of origin, early types, and distribution by man to various parts of the world. Interwoven in the story is a suggestion of the vast changes that have taken place in the plants themselves as they have been taken over from the wild and converted to the use of civilized man, with a glimpse at possibilities of further improvement by modern breeding methods. The 73-page article includes 32 full-page colored illustrations from paintings by Else Bostelmann. These show typical present-day forms of each vegetable, along with the growing plant, against a background that suggests something of its native clime.

"March of Time" Shows Bureau Work

Bureau research using radioactive fertilizer in tracer studies is shown in the March of Time release, "Report on the Atom." In one scene Merrell E. Jefferson is mixing fertilizer to which radioactive isotopes have been added. In another Arnold McKenzie and Jean W. Borland are making assays of the radioactive materials. There is an interesting shot of the main buildings and greenhouses at Plant Industry Station. The picture, which was released last spring, will be shown in commercial theaters in this country through October 18.

Paper Given at Pan American Congress

A. W. Turner, assistant chief, contributed a paper, "Mechanization of Agriculture with Special Application to Latin America," for presentation at the first Pan American Engineering Congress in Rio de Janeiro in July.

Processing of Pyrethrum Flowers Can be Streamlined

The drying of pyrethrum flowers can be speeded up and the handling simplified without loss of insecticidal value, report M. S. Lowman and J. W. Kelly (TM&SC). This is the most recent finding in research to explore methods that will help make pyrethrum a profitable crop in the United States.

Most of the 12 million pounds of pyrethrum flowers now processed here come from Kenya, South Africa. The plant is also grown commercially in Brazil and Japan. In all of these countries hand labor is used to weed the crop, to strip the flowers from the plants during the short time they are at peak bloom, and to dry them carefully and slowly at temperatures below 140° F. The cost of this type of production in the United States is prohibitive.

Previous research has shown that pyrethrum can be grown in many areas of this country, particularly on fertile soils in the northern half of the country. The plant, a perennial, requires a dormant period. It grows at relatively high altitudes and produces flowers the second year after planting. Before the war an experimental machine was devised that stripped the flowers from the plants. This could be used to harvest approximately 4 acres a day and would be suitable for contract work in an area where several farmers grow the crop.

In cooperative studies with BEPQ, Lowman and Kelly find that drying with temperatures far exceeding 140° F. damages only the appearance of the flowers. It does not impair the toxicity. They find also that the fresh flowers may be packed in sealed containers and held for months--like silage in a silo--and then dried rapidly without material loss of pyrethins. This would make it possible for growers to delay the drying until fall when they were not so busy with other crops.

The results indicate that the insecticidal value of the flowers is not materially reduced by drying methods that use much less space and facilities at harvesttime than is generally believed necessary. These streamlined methods, however, result in flowers of poorer appearance than that to which the trade has long been accustomed. While such flowers would be entirely suitable for the manufacture of sprays and agricultural dusts, they would not be acceptable for production of household insect powder, which the consumer expects to be a bright yellow. This was chosen as a standard before more reliable methods of evaluating toxicity were developed.

Ayers to Mushroom Investigations

Dr. T. T. Ayers, for several years engaged in sweetpotato research at Baton Rouge, La., has joined the Bureau staff at Beltsville, where he will work on mushroom investigations with Dr. E. B. Lambert (F&VC&D). For the immediate future Dr. Ayers will be concerned chiefly with studies on the nature and control of mushroom diseases.

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Dr. S. L. Emsweller presented two papers before the Canadian florists' annual meeting at Guelph, Ontario, in July. His topics were "Varieties, Culture, and Forcing of Easter Lilies," and "The Relation of Environment to Incidence of Plant Diseases."

Abruzzi Rye Leads for Winter Grazing in Georgia

Abruzzi rye and Red Rustproof oats appear to hold the best answer to winter grazing in the Georgia coastal plain, according to a study in which Dr. Glenn Burton (FC&D) cooperated with staff members of the Coastal Plain Experiment Station.

In tests begun in 1945 Abruzzi rye, Vicland oats, Rustproof oats, and Sanford wheat were planted in separate pastures and fertilized with 500 pounds of 4-8-6 fertilizer per acre each year. Over the period the Abruzzi rye and Rustproof oats, grazed rotationally, provided 100 grazing days and 165 pounds of beef gain per acre. In comparison Vicland oats and Sanford wheat produced 83 grazing days and 115 pounds of beef per acre.

Abruzzi rye was also more productive in clipping tests comparing 29 varieties of winter grain. Spring varieties of oats seeded in the fall produced more early grazing but less late grazing than winter varieties. October 1 plantings were generally better than those made earlier or later. Disease losses were reduced in plantings after October 1 through the use of resistant varieties, seed treatment, and crop rotation. No practical control has been found for aphids on winter grazing crops in that area.

Applications of nitrogen increased yield and protein content of winter grazing crops. Nitrate of soda applied at the rate of 200 pounds per acre at planting time and 200 pounds on January 1 produced 89 grazing days and 139 pounds of live weight as compared with 64 days and 99 pounds from plantings on which no nitrogen was applied. All pastures received 300 pounds of superphosphate and 100 pounds of muriate of potash per acre annually.

"Cephalothecium Disease" of Mushrooms Caused by Nematodes

Strong evidence of a biological balance in nature--the control of nematodes by a predaceous fungus--is indicated in recent investigations of the so-called Cephalothecium disease of mushrooms by Dr. E. B. Lambert and Dr. C. Drechsler (F&VC&D) and Dr. G. Steiner (Nematology).

Dr. Lambert found that the disease--long believed to be caused by a fungus parasite subsisting on the mushroom mycelium--did not behave in a truly typical manner. Further study disclosed that the fungus associated with the trouble was Arthrobotrys superba, which Dr. Drechsler had shown earlier to be a nematode-trapping fungus. Examination by Dr. Steiner indicated that the true cause of the mushroom disease is attack by nematodes, which puncture the mushroom mycelium and feed on the contents of the hyphae. The predaceous Arthrobotrys then builds upon the nematodes upon which it thrives.

Work is being undertaken by Dr. Steiner and E. J. Cairns on the relationship of nematodes to mushroom production and methods of control. At least two different species of Ditylenchus appear to be involved. Other members of this genus are responsible for the well-known nematode disease of narcissus bulbs and the stem nematode disease of alfalfa.

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Dr. Philip Brierly (F&VC&D) discussed his research on chrysanthemum stunt at the florists' summer short course at Ohio State University in July.

Visitors to Plant Industry Station

(1) The North American Lily Society observed its annual field day at Beltsville in June. Members saw work under way on garden lilies and were especially interested in propagation by means of leaf cuttings made with a small piece of the stem attached. These root readily in sand and several bulblets develop at the base of the leaf.

(2) About 300 delegates to the annual convention of the American Seed Trade Association. They inspected work in progress with chemical weed killers, improvements in ornamentals, lima beans, snap beans, lettuce, and tomatoes, and the toxic effects of DDT and other pesticides in the soil. Scores of seedsmen in small groups visited the Station during the week the convention was in session in Washington.

(3) Blueberry propagators and experiment station workers interested in Bureau blueberry material. From here the group went to Pemberton, N. J., where they observed the performance of promising selections including two planned for introduction this winter. The group also visited Toms River, N. J., to see row tests of all recent U. S. selections of blueberries in that section.

(4) About 25 county agents from New Jersey to observe research being carried on with fruits, ornamentals, tomatoes, pasture crops, and soil toxicity of new insecticides.

(5) Three distinguished foreigners: R. B. Tennant, assistant director of agriculture in New Zealand; Dr. Lars Spaldo, director of farm cooperatives and formerly minister of agriculture in Norway; and Sr. Paloma, sub-director of agriculture in Bolivia. Dr. Tennant was interested in grass research; Dr. Spaldo in corn, fertilization, dry-land farming, and research administration; and Sr. Paloma in small grains, sugar, and pasture research.

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News Briefs

A blue ribbon was awarded to "Farmhouse Plans for Northeastern States," MP 658, as best publication in its class at the annual meeting of the American Society of Agricultural Engineers in June. Architects J. Robert Dodge and Llewellyn Price (FB&RH) cooperated with housing specialists of BHNHE in preparing the publication.

L. S. Evans, weed specialist (CC&D), has transferred to Dr. P. V. Cardon's staff in ARA.

Dr. C. W. Bennett (SPI) reported on his investigations on tristeza disease of citrus in Campinas, Brazil, before a seminar at Plant Industry Station, July 1. He started the work that is now being conducted by Dr. T. J. Grant in cooperation with Dr. A. S. Costa of the Instituto Agronomico.

Orrin C. Turnquist (F&VC&D) has accepted a position with the Division of Agricultural Extension of the University of Minnesota, to take effect after potato harvest this fall. Mr. Turnquist has had charge of the potato breeding work in the Northwest.

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 * RETIREMENTS *
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Conrad B. Doyle (C&OFC&D), widely known throughout the cotton industry for his development work in the standardized production of cotton in one-variety communities, retired June 30 after more than 48 years with the Department.

Mr. Doyle's interest in cotton grew out of his acquaintance with the late Dr. O. F. Cook who was a neighbor of the Doyle family. Dr. Cook fathered the one-variety cotton community idea and it later fell to Doyle to keep the program going for his division. Today 60 percent of all the cotton grown in the United States is produced in such communities.

Mr. Doyle has also been actively interested in the sea-island cotton improvement project in the Southeastern States. He organized the production of this extra long and strong cotton in Puerto Rico for use in fabric for patrol balloons during World War II. As a member of cotton plant exploration groups, he spent parts of many years in Central and South America and the West Indies. One of the results of this work was the discovery and introduction from a remote region of southern Mexico of the now famous Acala cotton today grown in the irrigated valleys of the Southwest and Texas to the extent of about a million bales a year.

Mr. and Mrs. Doyle and their daughter live at 5039 Saratoga Avenue, Glen Cove, Md. Later they plan to move to the Florida west coast where a son now lives.

Dr. A. G. Johnson (CC&D) retired June 30 after 35 years of service. He began his research in botany and mycology while an undergraduate at South Dakota State College from 1900 to 1907. He continued it at Purdue University where he earned an MS degree and at the University of Wisconsin where he received a PhD in 1914. He began work in the Division July 1, 1914, and served continuously until his retirement.

Dr. Johnson's skill in recognizing host plants, plant diseases, and fungus parasites has helped many of his colleagues find the solution to their problems. He was the author or co-author of more than 60 bulletins and articles covering diseases of cereal and forage crops. He had a part in initiating hybrid corn breeding experiments in three Corn Belt States when many agronomists and plant breeders in the area were reluctant to undertake the development.

In addition to his work with plant diseases, fungi, and bacteria, Dr. Johnson has conducted experiments and surveys in seed treatment, weed control, cold resistance, and frost injury in plants, grain storage, selenium poisoning of livestock, and the "X-disease" of cattle.

Daniel Hansen, superintendent of the Huntley (Mont.) Field Station since 1910, retired June 30. A native of Utah, Mr. Hansen attended the Utah Agricultural College. He joined the Department in 1909 and served for a short time at the Truckee-Carson and Klamouth Experiment Farms before going to the Huntley station.

His research in irrigation agriculture contributed to the knowledge of the best ways to reclaim alkali land. He devised farming systems adapted to irrigated agriculture in the Yellowstone Valley and developed pasture mixtures that materially increased the carrying capacity of irrigated pastures.

 * DEATHS *

Dr. Charles F. Clark, engaged in potato research for the Bureau from 1910 until his retirement in 1941, died at his home in Riverside, Calif., May 8. He was 73 years old.

A native of Vermont, a graduate of the University of Vermont, he earned his doctorate at Cornell in 1909.

Dr. Clark's most outstanding contribution is the Katahdin potato, introduced 17 years ago and now the leading variety with more than 13 million bushels of certified seed produced for planting in 1949.

At the time of his death, Dr. Clark was revising Circular 741, "Description and Key to American Potato Varieties," which he collaborated with P. M. Lombard in preparing in 1946.

Dr. Neil E. Stevens, Bureau staff member from 1913 to 1936, died at Urbana, Ill., June 26, at the age of 62.

Dr. Stevens was born in Portland, Maine. He was a graduate of Bates College and held his doctorate from Yale. His work in the Bureau included research in chestnut blight, investigations in diseases of small fruits, particularly strawberries and cranberries, and direction of the Plant Disease Survey from 1930 to 1933, and of the corn disease project from 1933 to 1936. Leaving the Bureau, Dr. Stevens became professor of plant pathology and later head of the botany department at the University of Illinois. Ill health had recently forced him to resign the latter post. He leaves his widow, two sons, and a daughter.

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Departmental

Farmers' Bulletin 1418 (rev.) Lettuce growing in greenhouses

J.A.R. 1403 Complementary factors for dark-red plant color in upland cotton

J.A.R. 1404 Cytology of reproduction in sorghum vulgare

J.A.R. 1407 The Brazilian curly top of tomato and tobacco resembling North American and Argentine curly top of sugar beet

J.A.R. 1408 Some molds on wood favored by certain toxicants

J.A.R. 1409 False moths in cotton: Their origin, description, and variations in number

J.A.R. 1410 Bacterial leaf blight and stalk rot of corn

J.A.R. 1411 Symptoms of amino acid action on tobacco seedlings in aseptic culture

State Bulletin by Bureau Scientist

Moore, W. D., R. A. Conover, and D. L. Stoddard: The sclerotiniase disease of vegetable crops in Florida. Fla. Agr. Expt. Sta. Bul. 457, March 1949.

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